Functions of *Fusarium*-produced lytic enzymes and mycotoxins in pathogenesis and of metabolites responsible for plant defence response

Fusarium fungi are among the most common plant pathogens, causing numerous damaging diseases of many crop plants, including pea (*Pisum sativum* L.). Majority of *Fusarium* species synthesize toxic secondary metabolites – mycotoxins. It is known that the activity of the lytic enzyme complex is one of the essential pathogenicity mechanisms, as it allows the pathogen to penetrate the tissues of the plant host. On the other hand, roles of mycotoxins produced by the fungus are often unknown.

Authors' preliminary studies have revealed the metabolomic and proteomic differences between pea cultivars varying in susceptibility to fungal infections. Nevertheless, the molecular basis of these differences, as well as the communication between the plant and the pathogen during the infection, remain unknown.

The main scientific hypothesis of the proposed project assumes that resistant and susceptible pea cultivars produce different sets of metabolites, particularly when infected by a fungal pathogen. These metabolites, after being recognized by the pathogen, activate numerous signaling pathways as well as genes encoding lytic enzymes necessary for host tissue penetration. Explaining these issues is the main focus of the proposed project.

Plant reaction to both, biotic and abiotic stresses, have been studied for many years but mainly using model species (e.g. *Arabidopsis thaliana*). On the other hand, there is a constant lack of research concerning the intra-specific differences in crop reaction to fungal pathogen infection. Similarly, the mechanisms responsible for plant's resistance have been largely overlooked in the case of *Fusarium* pathogens of pea. The proposed project is an ambitious and novel approach to fill this knowledge gap. We will try to answer the basic questions regarding pea reaction to the *Fusarium* infection.

Establishing the roles of specific metabolites in the pathogenesis of pea will help to understand the interaction between susceptible and resistant plants and two pathogen species. It is the first research focused on the molecular mechanisms of the resistance of two pea cultivars varying in resistance against two *Fusarium* species (*F. proliferatum* and *F. oxysporum*).